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FLOOD INSURANCE STUDY

ORIGINAL

COMPLETED

MONROE COUNTY, ILLINOIS

UNINCORPORATED AREAS

MAY 15, 1986

Federal Emergency Management Agency

COMMUNITY NUMBER - 170509

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

MONROE COUNTY,
UNINCORPORATED AREAS,
ILLINOIS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Unincorporated Areas of Monroe County, Illinois, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared originally for purposes other than the National Flood Insurance Program. The data were identified as the best available at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. The Federal Emergency Management Agency (FEMA) performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the National Flood Insurance Program. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, Federal Emergency Management Agency, Chicago, Illinois for consideration for revision of this study.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were obtained from "Upper Mississippi River Water-Surface Profiles, River Mile 0.0 to 847.5" and the Flood Insurance Study for the Unincorporated Areas of St. Clair County, Illinois (References 1 and 2).

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1.3 Coordination

On July 9, 1985, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Monroe County, Illinois. The area of study is shown on the Vicinity Map (Figure 1). The incorporated areas within the county were excluded from this study.

The areas studied by detailed methods were selected based upon the extent and validity of available existing hydrologic and hydraulic data. Flooding caused by overflow of the Mississippi River and the Kaskaskia River within the county was studied in detail.

Approximate methods of analysis were used to study all remaining areas having a potential flood hazard that did not have detailed scientific or technical data available.

2.2 Community Description

Monroe County, located in southwestern Illinois, is bounded by St. Clair County on the north and east, Randolph County on the south, and St. Louis County, Missouri, Jefferson County, Missouri, Ste. Genevieve County, Missouri, and the Mississippi River on the west. The county is approximately 15 miles south of St. Louis, Missouri. State Routes 3, 156, and 159, and the Missouri Pacific Railroad are the major transportation routes through the county. The 1980 population of Monroe County was reported to be 20,117 (Reference 3).

The mean temperature in Monroe County ranges from about 32 degrees Fahrenheit (F.) in January to 79 degrees F. in July. The average annual precipitation is 35 inches. June is usually the wettest month (Reference 4).

2.3 Principal Flood Problems

Flooding in Monroe County is a result of overflow from the Mississippi and Kaskaskia Rivers, and various tributary streams throughout the county.

Flooding from the Mississippi River generally occurs in the spring and early summer months and is usually caused by melting snow and extensive rainfall over the watershed. Major floods from the Mississippi River have occurred in 1785, 1844, 1903, 1927, 1944, 1951, 1969, 1973, 1982, and 1983. Flooding shown along the Kaskaskia River is a result of backwater from the Mississippi River.

2.4 Flood Protection Measures

The levee system located along the Mississippi River, north of Carr Creek, provides protection against the 100-year frequency flood.

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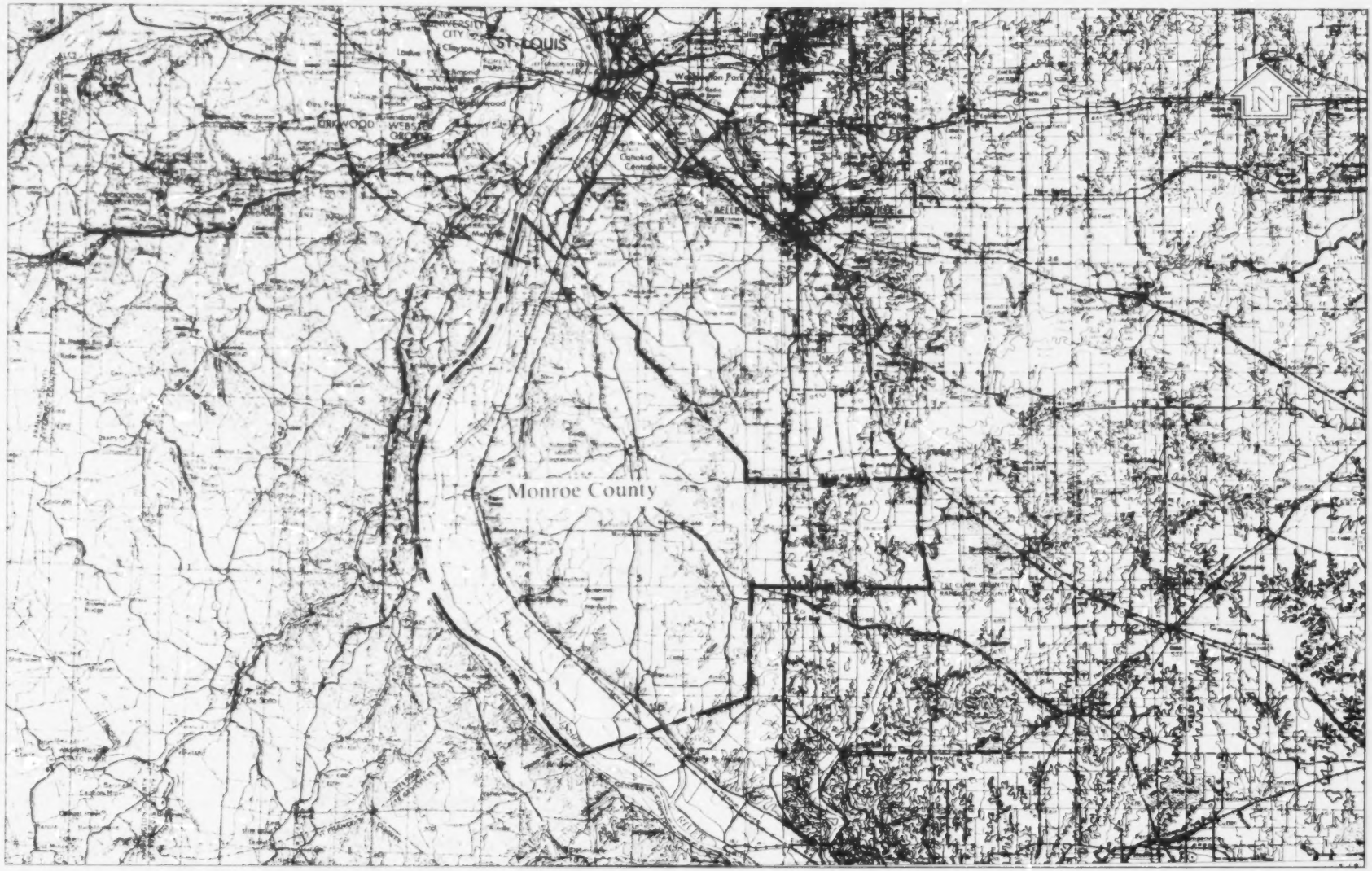

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONROE COUNTY, IL
(UNINCORPORATED AREAS)

APPROXIMATE SCALE
8 0 8 16 24 MILES

VICINITY MAP

The levee system located along the Mississippi River, south of Carr Creek, provides the community with some degree of protection against flooding. However, it has been ascertained that some of these levees may not protect the community from rare events such as the 100-year flood. The criteria used to evaluate protection against the 100-year flood are 1) adequate design, including freeboard, 2) structural stability, and 3) proper operation and maintenance. Levees that do not protect against the 100-year flood are not considered in the hydraulic analysis of the 100-year flood plain. Therefore, the boundaries of the 100-year flood plain as shown on the Flood Insurance Rate Map for streams with inadequate levees have been delineated by plotting the water-surface elevations as determined without considering the levees in place. This levee system was designed to provide protection against the 50-year flood and does not have sufficient freeboard to be certified for protection against the 100-year flood.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

Peak discharges for the Kaskaskia River were estimated by applying synthetic unit hydrograph methodology to the HEC-1 rainfall-runoff mathematical model developed by the U.S. Army Corps of Engineers (COE) (Reference 5). Floodflow frequency data were developed through analyses of stream and rainfall gage records (Reference 6).

Floodflow frequency data for the Mississippi River were developed through analyses of stream and rainfall gage records (Reference 6).

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

AVAILABLE

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MISSISSIPPI RIVER at River Mile 175	701,000	690,000	925,000	1,020,000	1,300,000
KASKASKIA RIVER just upstream of the confluence of Richland Creek	5,210	47,500	69,800	80,300	108,600

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals.

Channel and valley cross sections for the Kaskaskia River were obtained by field surveys.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map.

Starting water-surface elevations for the Kaskaskia River were based on normal depth analysis. Water-surface elevations of the 10-, 50-, 100-, and 500-year floods were computed using the COE HEC-2 computer program (Reference 7). Backwater effects from the Mississippi River shown on the Kaskaskia River were determined from the COE, Upper Mississippi River Profiles (Reference 1).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been drawn.

Areas of the county protected by levees are subject to potential risk due to possible failure or overtopping of the levee. These 500-year elevations were determined from the "without levee" analysis.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations shown on the profiles are, thus, considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929.

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4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 8).

For the streams studied by approximate methods, only the 100-year flood plain boundary was delineated using the Flood Hazard Boundary Map for Monroe County (Reference 9).

The 100- 500-year flood plain boundaries are shown on the Flood Boundary and Floodway Map. In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

Some areas of the community that are protected for the 100-year flood by a levee have been delineated as having potential risk due to possible failure or overtopping of the levee during larger floods.

4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. In Illinois though, under Revised Statutes, Section 65f, Chapter 19, as amended in 1973 (Reference 10), encroachment in the flood plain is limited

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to that which will cause only an insignificant increase in flood heights. Thus, at the recommendation of the Illinois Division of Water Resources, a floodway having no more than a 0.1-foot surcharge has been delineated for this study.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed and are presented in Table 2, Floodway Data.

A floodway is not shown for the entire reach of the Mississippi River due to lack of cross-section data necessary to compute a conveyance floodway.

As shown on the Flood Boundary and Floodway Map, the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and the 100-year flood plain boundaries are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway of the Kaskaskia River lie outside the county boundary.

The area between the floodway and the 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

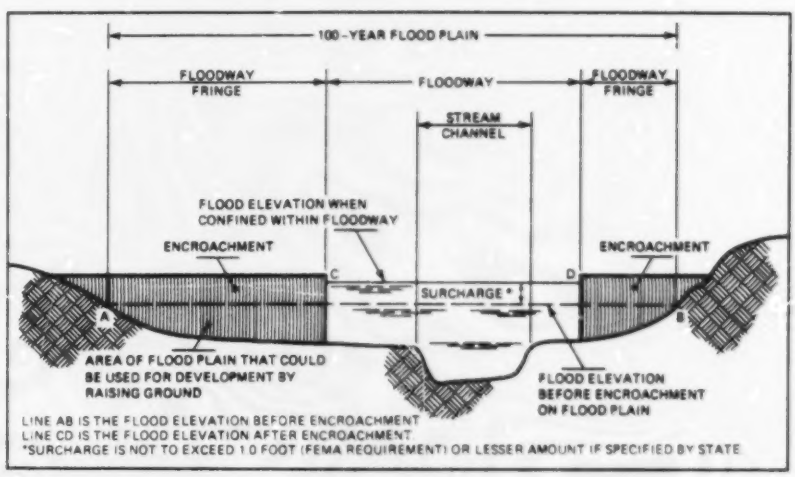
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT[3] FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
KASKASKIA RIVER								
A	22.6	7431	136,261	0.6	395.2	392.4	392.5	0.1
B	24.7	4036	71,932	1.1	395.2	392.7	392.8	0.1
C	26.2	5341	60,049	1.3	395.3	393.1	393.2	0.1

[1]MILES ABOVE MOUTH
[2]THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY
[3]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM MISSISSIPPI RIVER

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONROE COUNTY, IL

(UNINCORPORATED AREAS)

FLOODWAY DATA

KASKASKIA RIVER

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting Monroe County.

5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the riverine flooding sources of Monroe County are shown on the Flood Profiles and summarized in Table 3, Flood Insurance Zone Data.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a riverine reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest 0.5 foot, multiplied by 10, and shown as a 3-digit code. For example, if the difference between elevations is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.

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Zones A18 and A19:	Special Flood Hazard Areas inundated by the 100-year flood, with base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- and 500-year floods by dike, levee, or other water control structure; or, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and, areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 3, Flood Insurance Zone Data.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for Monroe County is, for insurance purposes, the principal product of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines for riverine flooding sources show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

Flood Insurance Studies for the Villages of Fults and Valmeyer, Monroe County and the Unincorporated Areas of Randolph, Ste. Genevieve, and St. Louis Counties, Illinois, are in progress and are in agreement with this study (References 11-15).

Flood Insurance Studies for the Unincorporated Areas of St. Clair County, Illinois, and the Unincorporated Areas of Jefferson County, Missouri, have been published and are in agreement with this study (References 2 and 16).

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for Monroe County (Reference 9).

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
MISSISSIPPI RIVER							
REACH 1	0100,0175	−9.0	−2.6	2.0	090	A18	VARIES—SEE MAP
REACH 2	0025,0050,0100	−9.5	−2.4	1.3	095	A19	VARIES—SEE MAP
REACH 3	0025	−9.2	−2.3	1.3	090	A18	VARIES—SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONROE COUNTY, IL
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

MISSISSIPPI RIVER

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7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 300 South Wacker Drive, Chicago, Illinois 60606.

8.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Army Corps of Engineers, Rock Island District, Upper Mississippi River Water-Surface Profiles, River Mile 0.0 to 847.5, November 1979.

2. Federal Emergency Management Agency, Flood Insurance Study, St. Clair County, Unincorporated Areas, Illinois, December 1981.

3. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Illinois, Washington, D.C., February 1982.

4. U.S. Geological Survey, Water Data Report IL-76-1, Water Resources Data for Illinois, Water Year 1976, Champaign, Illinois, 1977.

5. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, Davis, California, January 1973.

6. U.S. Water Resources Council, Bulletin No. 17, Guidelines for Determining Flood Flow Frequency, March 1976.

7. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles Generalized Computer Program, Davis, California, August 1977.

8. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 feet: Selma, Illinois-Missouri, 1964; Oakville, Missouri-Illinois, 1954, photorevised 1974; Webster Groves, Missouri-Illinois, 1954, photorevised 1974; Columbia, Illinois 1955, photorevised 1974; Red Bud, Illinois, 1970; New Athens West, Illinois, 1954, photorevised 1974; Renault, Illinois, 1970; Valmeyer, Illinois, 1954.

9. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Monroe County, Unincorporated Areas, Illinois, July 1978.

10. Illinois Department of Transportation, Division of Water Resources, Rules and Regulations, Regulation of Construction Within Flood Plains Established Pursuant to Section 65f, Chapter 19, Illinois Revised Statutes, Springfield, Illinois, 1973.

11. Federal Emergency Management Agency, Flood Insurance Study, Village of Fults, Monroe County, Illinois, in progress.

12. ————, Flood Insurance Study, Village of Valmeyer, Monroe County, Illinois, in progress.

13. ————, Flood Insurance Study, Randolph County, Unincorporated Areas, Illinois, in progress.

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14. ---------, Flood Insurance Study, Ste. Genevieve County, Unincorporated Areas, Missouri, in progress.

15. ---------, Flood Insurance Study, St. Louis County, Unincorporated Areas, Missouri, in progress.

16. ---------, Flood Insurance Study, Jefferson County, Unincorporated Areas, Missouri, May 1983.

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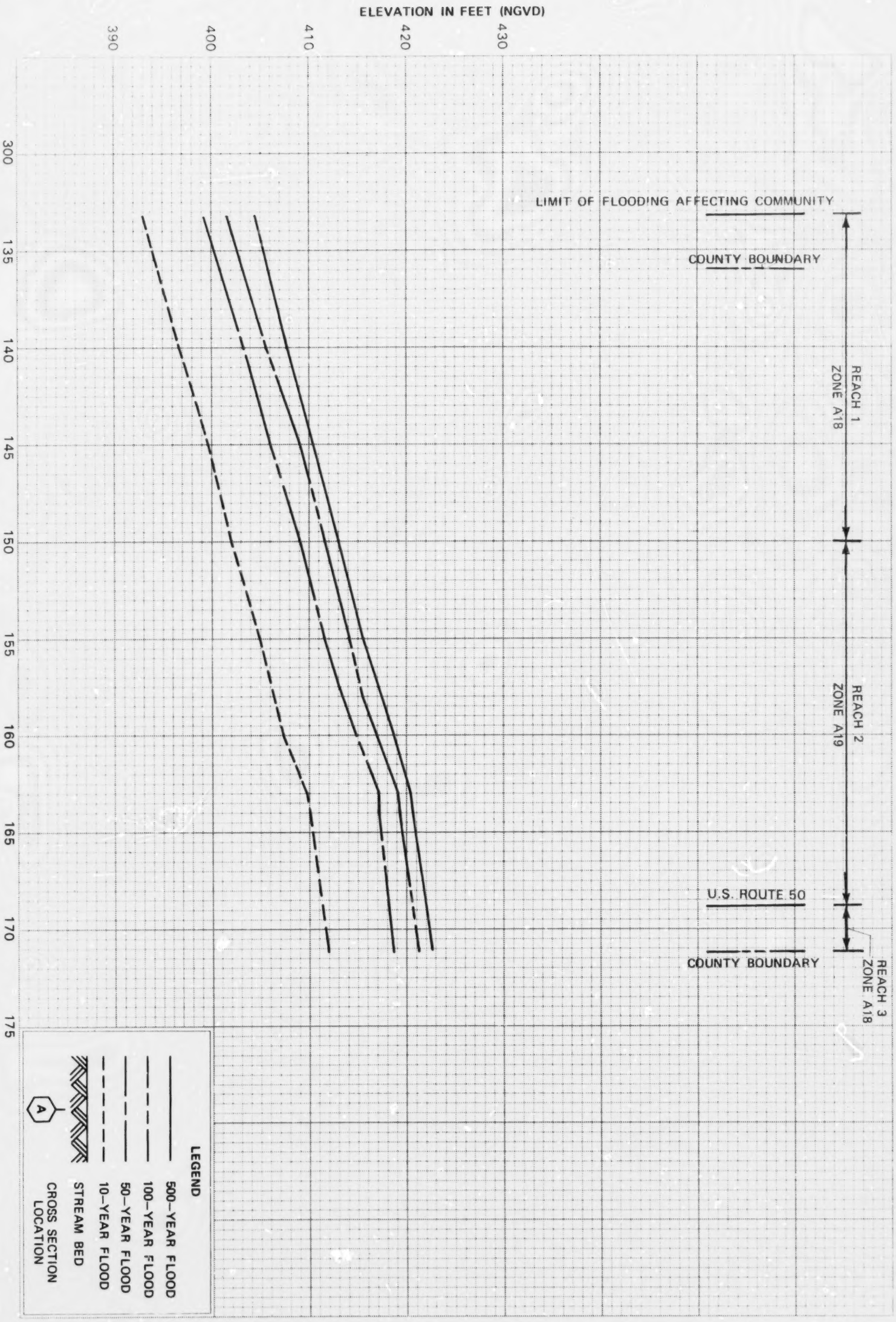

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FEDERAL EMERGENCY MANAGEMENT AGENCY

MONROE COUNTY, IL

(UNINCORPORATED AREAS)

FLOOD PROFILES

MISSISSIPPI RIVER

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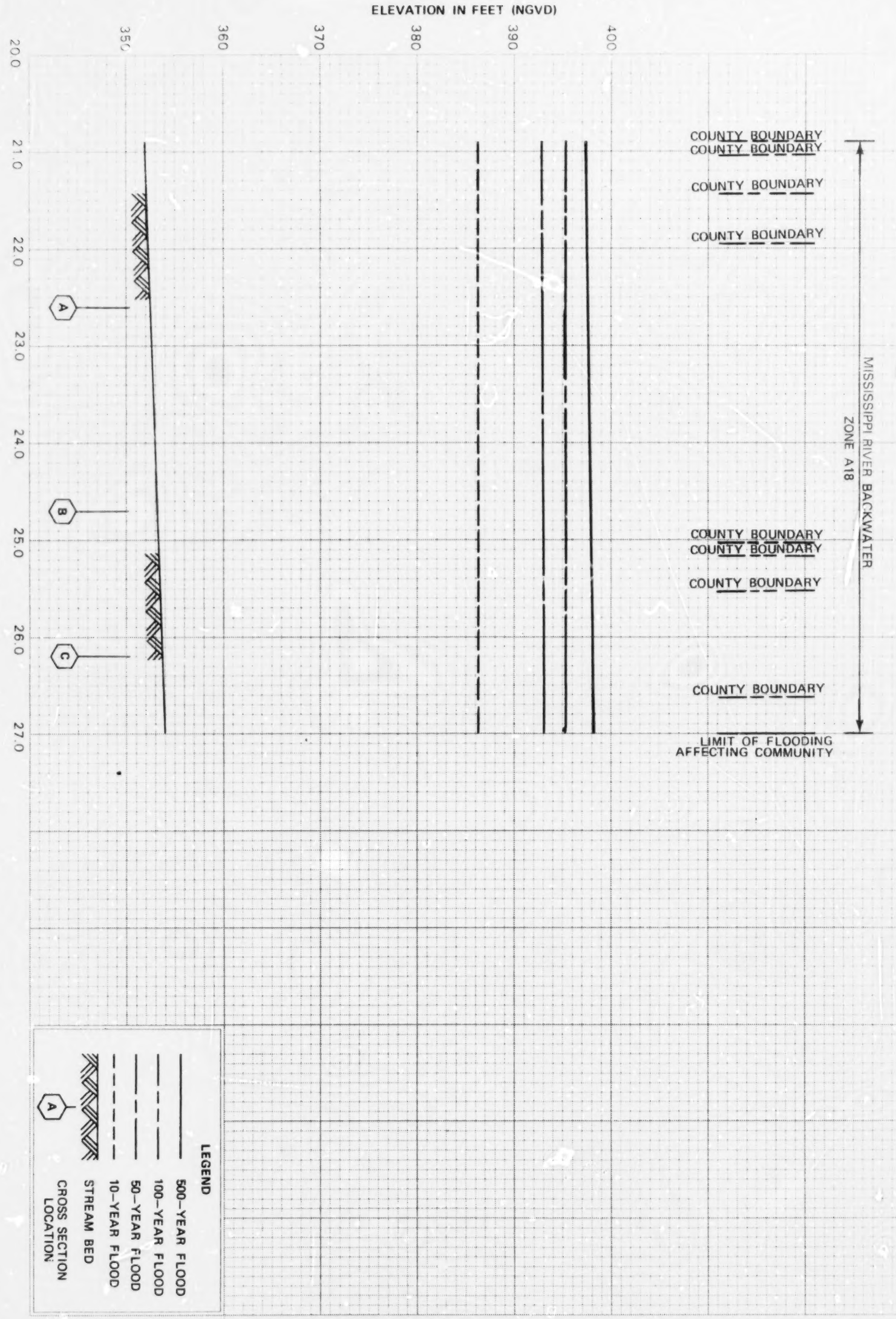

02P	FEDERAL EMERGENCY MANAGEMENT AGENCY **MONROE COUNTY, IL** **(UNINCORPORATED AREAS)**	**FLOOD PROFILES** **KASKASKIA RIVER**

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